and dust, are resistant to penicillin. These same organisms have also rapidly become resistant to the tetracyclines and erythromycin. New antimicrobial agents are constantly being sought since mortality from staphylococcal sepsis has again risen inordinately as a result of unyielding bacterial resistance consequent to the unwarranted use of antimicrobial agents.

The emergence of serious infections by unknown organisms and the associated problem of "superinfection" are particularly noteworthy in the urinary, pulmonary and intestinal tracts. So common has this clinical entity become that it must always be suspected when the patient does not respond to antimicrobial therapy in the predicted fashion. The control of these secondary or superinfections oftentimes requires the closest cooperation between the clinician and the laboratory in defining the offending organism and finding a way to control it. Control of these difficult infections has led to further hazards in antibiotic therapy, for physicians are tempted to use multiple antibiotic agents in such circumstances. It has been demonstrated that one antibiotic agent may actually diminish the effectiveness of another agent, and complex problems of bacterial antagonism and synergism result from injudicious use of antibiotic agents.

The time has come when physicians must take cognizance again of the laws of Nature in the control of infection and the development of immunity, and search out the true values of their skill, knowledge and judgment. The understanding of these laws will safeguard better the welfare of their patients than the indiscriminate use of the "antibiotic pill" or injection.

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Editorial Comment . . .

Problems of Research on Smog

TO SPEAK OF THE PROBLEMS and difficulties in medical research on smog seems to denote a rather negativistic approach. However, considering the nature of some of the comments in the press and some of the programs on radio and television, it appears that a recapitulation of the difficulties and problems and a wholesome balancing of our approach to the problem is quite in order. Much of the material in the press and on radio and television would lead us to believe that the whole problem can be simply solved by abolishing all the sources of smog. This is undoubtedly true but the improbability of accomplishment is great. The press, radio and television convey to the public only the information given them by the groups interested in smog abatement, both from the research angle and the administrative angle.

Due to the lack of coordinated effort and the lack of interchange of information, it appears as though each group would be entirely satisfied if only its specific problems were solved. As an example, if the substance in the atmosphere causing damage to the leafy vegetable crops could be removed, the agricultural group would apparently be satisfied. The same would be true of each group having a specific complaint, such as that the beautiful landscape is obscured, or that smog causes smarting of the eyes.

This seeming incoordination is undoubtedly due to the lack of communication and understanding between all groups. We in medicine have been remiss in not communicating with the other groups until recently. We must now bring before the public and the other groups the fact that smog presents many possible insidious effects on the health of the human being. Since we can point to no specific cases of death due to smog, nor to any new diseases caused by smog, nor to any terrifying physical defects caused by smog, it is extremely difficult to arouse enough interest in the public in general, in other groups interested in smog abatement, in our legislators and many times in our own medical profession to support any research in the field of medical effects of smog. To stimulate interest is one of the major problems, since the expense of research of the kind needed is comparatively great and full interest and support of all groups is of utmost importance. The great majority of the public outside of the medical profession will have to be informed and educated as to the need for medical research on the smog problem. Everyone agrees that research in the field of water pollution was, and still is, quite necessary and that it has paid off in stopping water-borne epidemics, in halting the poisoning of fish and game, and in many other ways. If it is possible to show the

public that research on air pollution can be as beneficial, or more beneficial, then a major hurdle will have been topped.

The difficulties encountered in the actual technical research portion of this problem are varied and numerous. The greatest difficulty is psychological in nature in that the research is rather dull and uninteresting because it takes considerable time and the results are not dramatic. The inhalation studies to determine maximal permissible concentration are expensive and tedious and at best take from 12 to 30 months for each pollutant studied. Unfortunately there are not many who will undertake research of this type.

Smog is a mixture of possibly hundreds of pollutants, some of them in the original state in which they were dumped into the atmosphere and others as new compounds formed as the result of chemical reactions occurring due to the presence of sunlight, ozone, oxides of nitrogen and other factors in the atmosphere. With this wide spectrum of pollutants, it becomes quite a problem to select the compounds most likely to cause deleterious effects on human health. After a compound has been selected for study, the problem of preparing it in a pure state arises; and as a further difficulty to plague the researcher, there are, for many of the compounds, no accurate methods of analysis of the minute quantities contained in air and animal tissue.

Another major difficulty experienced by persons interested in smog research is the appalling lack of what might well be classed as clinical material and clinical information. A somewhat generalized clinical relationship of human health to smog concentration might be obtained by cooperation of the practicing physician. A daily report of case loads of specific types, such as asthma and upper respiratory tract infections, could be correlated with the concentration of smog, as determined by the Air Pollution Control District. If the practicing physicians who report are objective and unbiased by personal feelings on the smog problem, it is logical to assume that statistical analysis of the reports, correlated with the smog analysis, would give some indication as to whether or not clinical information might be expected from a study of this kind.

Chemists, engineers, meteorologists and physicists have made great strides in determining many of the sources of smog, as well as in identifying many of its constituents. Much more work is necessary in these scientific fields, however, before a successful conclusion can be reached. Research has been started in the biological and medical fields in a number of places but, considering the magnitude of the problem, it is fair to say that in the field of medicine the surface has barely been scratched. Before the smog problem can truly be said to be conquered, biologists and medical men must supply information concerning the maximal permissible concentration of many or all of the constituents of smog. It is only from information of this kind that teeth can be fashioned for the laws regulating air pollution. The necessary research in this field can be begun and prosecuted only if full support and interest, both moral and financial, are given by everyone—most of all the researchers' colleagues in the field of medicine.

FRED A. BRYAN, M.D.
Department of Medicine
School of Medicine
University of California
Los Angeles 24.